REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

Upon entry of the foregoing amendments, claims 1, 3-8, 10, 11, 13-16 and 18-22 are pending in the application, with claims 1 and 11 being independent. Claims 1, 3, 4, 10, 11 and 18 are sought to be amended. Claims 2, 9, 12 and 17 are sought to be canceled. New claims 19 - 22 are sought to be added. These changes are believed to add no new matter, and their entry is respectfully requested.

Based on the above amendments and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

At the outset, Applicant's representative Albert J. Fasulo, II, thanks Examiner Christine Sung for the courtesy of a telephonic interview held March 24, 2005. During the interview technical differences between the applied references and claims 1 and 11, and various proposed amendments thereto, were discussed. No agreement was reached.

The prior art rejections spanning pages 2-8 of the Office Action are traversed.

Claims 1 and 11 - Liquid Cocktail Mixture

Claim 11 is amended to also includes all of the features recited in (i) claims 13, 14 and 15 in the alternative, and (ii) claims 12 and 17, i.e., a rare earth chelate wavelength shifter component. Correspondingly, claim 1 is amended to recite, in addition to its system/apparatus features, a liquid cocktail mixture having the same composition as the liquid mixture recited in amended claim 11. Namely, claim 1 is amended to include all of the features of (i) claims 5, 6 and 7 in the alternative, and (ii) claims 2 and 9.

The liquid cocktail mixture for detecting the presence of neutrons recited in both claims 1 and 11 (the "claimed mixture") is advantageously relatively non-toxic, minimally caustic and inexpensive compared with organic/solvent-based prior art mixtures. Another advantage is that $LiBF_4$, LiCl, $NaBF_4$ and the rare earth chelate each readily dissolve in water, and therefore, the claimed mixture does not require additional water miscibility enhancing compounds. See paragraphs [0012] and [0013] of the

present application for other advantages. None of the applied references alone or in combination teaches or suggests the inventive liquid cocktail mixture recited in both claims 1 and 11.

Tarkkanen (U.S. Pat. 3,999,070)

Tarkkanen does not teach or suggest any of the following claim 1 and 11 features: (i) a neutron absorber component comprised of $LiBF_4$, LiCl or $NaBF_4$; (ii) that said neutron absorber component is dissolved in water; or (iii) a rare earth chelate wavelength shifter as a component of the liquid mixture. The mixture of Tarkkanen does not exhibit the advantages of the claimed mixture mentioned above. Based on the amendments to claims 1 and 11, Applicant respectfully submits that Tarkkanen has little, if any, prior art relevance to either of claims 1 or 11.

Tarkkanen teaches a relatively complicated, toxic organic/solvent-based liquid scintillation mixture including, preferably, PPO as a fluor and POPOP as a wavelength shifter. Tarkkanen, col. 4, lines 31-35 and 56-58. See also, e.g., Tarkkanen examples I, II and V listing the "Scintillator mixture" as "diphenyloxazole" and "orthomethylstyryl." As a result, the Tarkkanen mixture disadvantageously requires additives to enhance "miscibility with water," unlike the liquid cocktail mixture recited in both claims 1 and 11. See Tarkkanen generally throughout, and specifically at col. 2, lines 36-44.

Tarkkanen does not teach or suggest the feature of a rare earth chelate wavelength shifter component of the liquid cocktail mixture of claims 1 and 11. In contrast, Tarkkanen teaches a scintillation mixture including "a secondary solute such as a wavelength shifter" specifically made of "POPOP, alpha-NOPON, DPH [or] alpha-NPO." Tarkkanen, col. 4, lines 21-22 and lines 32-37. POPOP is the "preferred" wavelength shifter. Tarkkanen, col. 4, lines 56-58.

Yoshina (U.S. Pat. 4,975,222)

$LiBF_4$ dissolved in water

The Examiner rejects the claim feature of a neutron absorber comprising $LiBF_4$ dissolved in water, now also incorporated into claims 1 and 11 (see also claims 5 and 13, respectively). See Office Action paragraphs 7 and 12. The Examiner admits Tarkkanen does not disclose $LiBF_4$, and thus relies on Yoshina to supply this missing claim feature, stating "[o]ne of ordinary skill in the art would be motivated to use *the material disclosed by Yoshina* with the invention disclosed by Tarkkanen." Applicant disagrees.

Yoshina teaches a radiation detecting *solid* element including a polyfilm *element* impregnated with *dried* $LiBF_4$. Yoshina: col. 7, lines 3-9; and, claims 1 and 3. Yoshina states that the *solid* element includes radiation sensitive materials [including $LiBF_4$] dispersed into or combined with *solid* conductive polymers. Yoshina: col. 3, lines 33-40. Therefore, Yoshina fails to teach or suggest either *a liquid cocktail mixture* or a neutron absorber of $LiBF_4$ *dissolved in water* as recited in claims 1 and 11, and in fact, teaches away from these features.

Because "*the material disclosed by Yoshina*" as a neutron absorber is *dried* $LiBF_4$ combined with *solid* conductive polymers, instead of $LiBF_4$ *dissolved in water* as recited in claims 1 and 11, the Examiner is forced to conveniently select or pick the mere mention of "$LiBF_4$" from Yoshina while ignoring the express teaching of Yoshina, i.e., *dried* $LiBF_4$ combined with *solid* conductive polymers. Such selective picking and choosing of "$LiBF_4$" from Yoshina and applying it completely out of context to liquids in Tarkkanen to reconstruct the features of claims 5 and 13 (now incorporated into claims 1 and 11, respectively) improperly fails to consider each prior art reference, Yoshina and Tarkkanen, in its entirety, i.e., as a whole, including those portions of each reference that would teach away from the claimed invention as a whole. Moreover, such selective picking and choosing impermissibly results in hindsight reconstruction of the invention of claims 5 and 13 (now incorporated into claims 1 and 11, respectively). MPEP Sections 2141.II and 2141.02.

$NaBF_4$ dissolved in water

At paragraph 7 of the Office Action, the Examiner also rejects claim 7, apparently relying on Yoshina to supply the missing feature of a neutron absorber comprising $NaBF_4$ dissolved in water. Applicant has reviewed Yoshina carefully. Yoshina does not even mention $NaBF_4$, let alone teach or suggest same dissolved in water as now also recited in claims 1 and 11.

Maeda (U.S. patent no. 4,620,939)

LiCl dissolved in water

The Examiner rejects the feature of a neutron absorber comprising LiCl dissolved in water, now also incorporated into claims 1 and 11 (see also claims 6 and 14). See Office Action paragraphs 6 and 13. The Examiner admits Tarkkanen does not disclose LiCl, and thus relies on Maeda to supply this missing feature, stating "[o]ne of ordinary skill in the art would be motivated to use *the material disclosed by Maeda* with the invention disclosed by Tarkkanen." Applicant Disagrees.

Maeda teaches an abrasion resistant *solid* scintillation converter made of *rubber* having added thereto solid *particulate* LiCl. Maeda: col. 1, lines 10-12; and col. 3, lines 7-17 and 38-46. Therefore, Maeda fails to teach or suggest either *a liquid cocktail mixture* or a neutron absorber of LiCl *dissolved in water* as recited in claims 1 and 11, and in fact, teaches away from these features.

Because "*the material disclosed by Maeda*" as a neutron absorber is *solid* $LiBF_4$ with *rubber*, instead of LiCl *dissolved in water* as recited in claims 1 and 11, the Examiner is forced to conveniently select or pick "LiCl" from Maeda while completely ignoring the express teaching of Maeda, i.e., *solid* $LiBF_4$ with *rubber*. Such selective picking and choosing of LiCl from Maeda and applying it out of context in Tarkkanen to reconstruct the features of claims 6 and 14 (now also incorporated into claims 1 and 11, respectively) improperly fails to consider each prior art reference, namely Maeda and Tarkkanen, in its entirety; i.e., as a whole, including those portions that would teach away

from the claimed invention. MPEP Section 2141.02. Moreover, such selective picking and choosing impermissibly results in hindsight reconstruction of rejected claims 6 and 14 (now also incorporated into claims 1 and 11, respectively).

$NaBF_4$ dissolved in water

At paragraph 13 of the Office Action, the Examiner also rejects claim 15, apparently relying on Maeda to supply the missing feature of a neutron absorber comprising $NaBF_4$ dissolved in water. Applicant has reviewed Maeda carefully. Maeda does not even mention $NaBF_4$, let alone teach or suggest same dissolved in water as now also recited in claims 1 and 11.

Parkinson (U.S. Pat. 5,095,099)

Rare Earth Chelate Wavelength Shifter

The Examiner rejects the feature of a rare earth chelate wavelength shifter component of the liquid cocktail mixture, now incorporated into claims 1 and 11 (see canceled claims 2,9 and 11,17, respectively). See Office Action paragraphs 11 and 15. The Examiner admits Tarkkanen does not specify the feature of a rare earth chelate wavelength shifter, and thus relies on Parkinson to supply this feature, asserting that rare earth chelates are known wavelength shifters, as disclosed in Parkinson, and one of ordinary skill in the art would have been motivated to use the conventional wavelength shifter of Parkinson with Tarkkanen. Applicant disagrees.

Tarkkanen teaches a scintillation solute including "a secondary solute such as a wavelength shifter" made of "POPOP, alpha-NOPON, DPH [or] alpha-NPO." Tarkkanen, col. 4, lines 21-22 and lines 32-37. POPOP is the "preferred" wavelength shifter. Tarkkanen, col. 4, lines 56-58.

Parkinson suggests chelates as wavelength shifters for solar concentrators, lasers, phosphors and optical communications. Parkinson col. 1, lines 17-18; col. 4, lines 15-19. Thus, Parkinson occupies a different field of endeavor from the invention of claims 1 and

11, which are directed to a liquid cocktail mixture for detecting the presence of neutrons. Parkinson has little if any relevance to the neutron detecting liquid mixture recited in claims 1 and 11. Different fields of endeavor aside, Parkinson teaches more specifically *substrates* containing *solid* chelates. Parkinson, col. 4, line 30-33; col. 5, lines 56-59 and lines 63-67; col. Parkinson does not teach or suggest a "*liquid* cocktail mixture . . . comprising . . . a neutron absorber component dissolved in water . . . [in combination with] a chelate wavelength shifter component [of the *liquid* cocktail mixture]," as recited in claims 1 and 11.

For the above reasons, one of ordinary skill in the art at the time the inventions of claims 1 and 11 were made would not have been motivated to adopt Parkinson's chelate wavelength shifter instead of Tarkkanen's "preferred" POPOP wavelength shifter for a scintillation mixture in order to reconstruct the liquid mixture for detecting the presence of neutrons as recited in the claims. Such reconstructions of claims 1 and 11 from Tarkkanen and Parkinson require improper hindsight and ignore the express teachings of both Tarkkanen and Parkinson as described above.

Claim 1 - System Features

In addition to the reasons for patentability advanced above, claim 1 is also patentable over the applied references for the additional reasons advanced below.

Langenbrunner (U.S. Pat. 5,514,870)

At paragraph 6 of the Office Action, the Examiner rejects claim 1 relying on Langenbrunner to supply the system/apparatus features recited in claim 1. The Examiner argues it would have been obvious "to switch the crystal scintillator of Langenbrunner with the liquid scintillator [of] Tarkkanen . . . (see . . . Cusano . . .)." Applicant disagrees.

As mentioned above, Tarkkanen does not disclose or suggest the liquid cocktail mixture recited in claim 1 as amended.

Langenbrunner teaches only *solid* crystal and *solid* plastic scintillators enclosed in a housing. Langenbrunner is limited to the field of *solid* scintillators. See,

Langenbrunner, Field of Invention, col. 1, lines 12-14. Therefore, Langenbrunner is not relevant to the invention features of claim 1 directed specifically to a *liquid* cocktail mixture. In fact, Applicant respectfully asserts that *each and every* reference, including Langenbrunner, cited by the Examiner in the Office Action that teaches or suggests *solid* components for neutron capture, scintillation, or wavelength shifting teaches away from the *liquid* mixture components specifically recited in the claims of the present application.

The liquid-for-crystal "switch" proposed by the Examiner, namely, replacing the crystal scintillator of Langenbrunner with the liquid scintillator of Tarkkanen, would render the system of Langenbrunner inoperable for its intended purpose. Langenbrunner does not randomly select scintillator compositions. In contrast, Langenbrunner carefully selects two different, layered, *solid* scintillators (10, 12) as a function of their different interrelated characteristics, including specific emitted light response times and absorption characteristics, to achieve the main goals of the Langenbrunner invention. See, e.g., Langenbrunner: claim 1; and col. 4, lines 38-41. The liquid for solid scintillator "switch" proposed by the Examiner ignores and would destroy the interrelated characteristics necessary in Langenbrunner, and thereby render the Langenbrunner system inoperable for its intended purpose.

Cusano References (U.S. Pats. 4,415,808 and 4,262,202)

The Examiner relies on the Cusano references as teaching the interchangeability of liquid and solid scintillators, and thus as motivation to "switch" the Langenbrunner solid(s) for the liquid mixture of Tarkkanen. Applicant disagrees with this construction.

One of ordinary skill at the time the invention of claim 1 (or claim 11) was made would not have looked to the Cusano references as bridging/motivation-to-combine references as argued by the Examiner in order to reconstruct the claimed invention because the Cusano references and the claimed invention are each directed to different fields of endeavor. Specifically, both of the Cusano references are directed to scintillation detectors for *x-ray* or *gamma rays* (i.e., photons) useful for CT scans, *not* to detecting *neutrons*. See Cusano '808 and Cusano '202 throughout. In contrast, claim 1 is

directed to "a system for detecting *neutron* radiation," including "a *neutron* absorber." The processes/effects involved with absorbing *neutrons* versus *photons* are entirely different from each other and are not interchangeable. Cusano is not reasonably pertinent to the problem to which the invention is directed, i.e., liquid mixtures for detecting *neutrons*. MPEP 2141.01(a). This point would not be ignored by one having ordinary skill in the art at the time the invention made.

Moreover, the Cusano references teach specific *organic* scintillators in *solvents*, not a liquid cocktail mixture comprised of a neutron absorber dissolved in *water* with a liquid scintillator, as recited in claim 1. Cusano '202, col. 3, lines 4-8, and throughout. Cusano does no more than reinforce the pervasive use of solvent/organic-based scintillator mixtures, specifically for gamma and x-ray detecting compositions, not for neutron detecting compositions. Accordingly, only through the improper use of hindsight can Laugenbrunner with Tarkkanen be combined to reconstruct claim 1.

All of the claims depending from claims 1 and 11 are patentable for at least the same reasons claims 1 and 11 are patentable.

Claims 5-7 and 13-15

Each of claims 5-7 and 13-15 is patentable on its own merits for at least the reasons mentioned above for its corresponding features recited in either claims 1 or 11.

Claim 8 and 16

Each of claims 8 and 16 is patentable on its own merits. Tarkkanen and **Zarling** (U.S. Pat. 5,698,397), alone or in combination, do not teach or suggest the scintillator component recited in each of claims claim 8 and 16.

Tarkkanen teaches scintillator solutes including PPO as a fluor and POPOP as a preferred wavelength shifter. Thus, Tarkkanen does not teach or suggest the component recited in claims 8 and 16.

Zarling has nothing to do with scintillator compositions *for detecting neutrons* as recited in claims 8 and 16 (depending from claims 1 and 11, respectively). In contrast,

Zarling is directed to labels which permit detection of cells and biological macromolecules proteins, and other analytes, through photonic absorption. See Zarling, e.g., at: col. 1, lines 19-25; col.5, lines 29-45; col. 10 lines 17-20; and claim 1. Clearly, Zarling occupies a field completely different from that of the invention recited in each of claims 8 and 16, which is directed to a liquid mixture to detect neutrons. One of ordinary skill in the art faced with the task of creating a neutron detecting mixture would not have turned to Zarling over Tarkkanen for a wavelength shifting compound/scintillator composition compatible with detecting neutrons. Thus, the rejections of claims 8 and 16 require improper hindsight to reconstruct the recited features.

Claims 10 and 18

Each of claims 10 and 18 is patentable for at least the reasons advanced above for the patentability of claims 1 and 11, especially in connection with Parkinson. See above.

New Claims 19 - 22

Exemplary support for the features recited in each of new claims 19 - 22 and advantages attendant thereto can be found at paragraph [0016] of the present application. Each of claims 19 - 22 is patentable on its own merits because the applied references, taken individually or in combination, fail to teach or suggest the combination of features recited in each claim

Conclusion

On the basis of the above amendments, reconsideration and allowance of this application is believed warranted. If the Examiner believes, for any reason, that personal communication will expedite prosecution, the Examiner is invited to telephone the undersigned at the number provided.

Yours truly,

THE JOHNS HOPKINS UNIVERSITY
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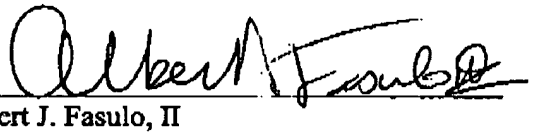
By 
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